



SEQUENCE LISTING

<110> Falco, S. Carl
Cahoon, Rebecca E.

<120> Vitamin B Metabolism Proteins

<130> BB-1201 US DIV

<140> 10/081,301
<141> 2002-02-20

<150> 60/096,342
<151> 1998-08-12

<160> 16

<170> Microsoft Office 97

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<211> 933
<212> DNA
<213> Zea mays

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ctccctggct ttgatgtgga tccaataaaac tctgtacagt ttctaatca tacaggatac 180
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gaggaaaaatc agttgcttca ttatacccat ttattaacag gttatataagg ctcagttcc 300
tttttagata ctgtgctaca agttgttgag aaattgcgtt cagttaatcc tgatcttgta 360
tatgtttgtg acccagtctt aggtgtatgaa gaaaaactat atgttcctca ggaggtata 420
tctgtttatc aacagaaggt tggccatgtt gcttcaatgc ttacacctaa ccaatttcaa 480
gttgaactac ttactggatt gaggatcacc tccgaagaag atgggttgac agcttgtaat 540
accctccaca gtgccggacc acagaaggtg gttataacta gtgctctt tgaaggtaag 600
ctgctcccta tcggaagtca caaaaaaaaaa gaggaacaac agccagaaca atttaagatt 660
gagataccaa agataacctgc atatttcacg ggaactggag atttgcacac tgctctctta 720
ctaggatgga gtaataaaata tcctgatagc ctcgagaaag cagcagaact ggcagttcc 780
agtttgcagg cacttctgaa aagaactgtg gaagactata aaatggccgg ctgcaccca 840
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<210> 2
<211> 310
<212> PRT
<213>. Zea mays

<400> 2
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1 5 10 15

Arg Val Leu Ser Ile Gln Ser His Thr Val Gln Gly Tyr Val Gly Asn
20 25 30

Lys Ser Ala Val Phe Pro Leu Gln Leu Leu Gly Phe Asp Val Asp Pro
35 40 45

Ile Asn Ser Val Gln Phe Ser Asn His Thr Gly Tyr Pro Thr Phe Arg
50 55 60

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27

Gly Gln Val Leu Asn Gly Lys Gln Leu Trp Asp Leu Ile Glu Gly Leu
65 70 75 80

Glu Glu Asn Gln Leu Leu His Tyr Thr His Leu Leu Thr Gly Tyr Ile
85 90 95

Gly Ser Val Ser Phe Leu Asp Thr Val Leu Gln Val Val Glu Lys Leu
100 105 110

Arg Ser Val Asn Pro Asp Leu Val Tyr Val Cys Asp Pro Val Leu Gly
115 120 125

Asp Glu Gly Lys Leu Tyr Val Pro Gln Glu Val Ile Ser Val Tyr Gln
130 135 140

Gln Lys Val Val Pro Val Ala Ser Met Leu Thr Pro Asn Gln Phe Glu
145 150 155 160

Val Glu Leu Leu Thr Gly Leu Arg Ile Thr Ser Glu Glu Asp Gly Leu
165 170 175

Thr Ala Cys Asn Thr Leu His Ser Ala Gly Pro Gln Lys Val Val Ile
180 185 190

Thr Ser Ala Leu Ile Glu Gly Lys Leu Leu Leu Ile Gly Ser His Lys
195 200 205

Lys Thr Glu Glu Gln Gln Pro Glu Gln Phe Lys Ile Glu Ile Pro Lys
210 215 220

Ile Pro Ala Tyr Phe Thr Gly Thr Gly Asp Leu Thr Thr Ala Leu Leu
225 230 235 240

Leu Gly Trp Ser Asn Lys Tyr Pro Asp Ser Leu Glu Lys Ala Ala Glu
245 250 255

Leu Ala Val Ser Ser Leu Gln Ala Leu Leu Lys Arg Thr Val Glu Asp
260 265 270

Tyr Lys Met Ala Gly Phe Asp Pro Ser Thr Ser Ser Leu Glu Ile Arg
275 280 285

Leu Ile Gln Ser Gln Asp Glu Ile Arg Asn Pro Thr Val Thr Cys Lys
290 295 300

Ala Val Lys Tyr Gly Ser
305 310

<210> 3
<211> 413
<212> DNA
<213> Oryza sativa

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<223> n = a, c, g or t

BP

<220>
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<220>
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agcaaaggaa caaccaccag aacaatttaa gattgagata cccaagatac ctgcataattt 180
cacggcact ggagatttaa caactgcct tctacttaga tggagtaata aataccctga 240
taaccttggg gaggcgctg aactggcggt atccatttgc aaggcaccacca taaggagaac 300
tgtggaaagac tataaaagac tgggttgac cctccaacca acaccttagag atccgcctgg 360
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<210> 4
<211> 136
<212> PRT
<213> Oryza sativa

<220>
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<222> (127)...(128)...(129)
<223> Xaa = any amino acid

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1 5 10 15

Gly Pro Arg Lys Val Val Ile Thr Ser Ala Leu Ile Glu Asp Lys Leu
20 25 30

Leu Leu Ile Gly Ser His Lys Lys Ala Lys Glu Gln Pro Pro Glu Gln
35 40 45

Phe Lys Ile Glu Ile Pro Lys Ile Pro Ala Tyr Phe Thr Gly Thr Gly
50 55 60

Asp Leu Thr Thr Ala Leu Leu Gly Trp Ser Asn Lys Tyr Pro Asp
65 70 75 80

Asn Leu Gly Glu Gly Ala Glu Leu Ala Val Ser Ile Cys Lys Ala Pro
85 90 95

Leu Arg Arg Thr Val Glu Asp Tyr Lys Arg Leu Gly Leu Thr Leu Gln
100 105 110

Pro Thr Pro Arg Asp Pro Pro Gly Phe Lys Thr Lys Asp Glu Xaa Xaa
115 120 125

Xaa Pro Lys Ile His Ala Ser Cys

JG

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<211> 812
<212> DNA
<213> Glycine max

<220>
<221> unsure
<222> (577)
<223> n = a, c, g or t

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<222> (610)
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<220>
<221> unsure
<222> (683)
<223> n = a, c, g or t

B /
<220>
<221> unsure
<222> (687)
<223> n = a, c, g or t

<220>
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<222> (742)
<223> n = a, c, g or t

<220>
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<222> (744)
<223> n = a, c, g or t

<220>
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<222> (746)
<223> n = a, c, g or t

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<222> (755)
<223> n = a, c, g or t

<220>
<221> unsure
<222> (760)
<223> n = a, c, g or t

<220>
<221> unsure
<222> (769)
<223> n = a, c, g or t

<220>
<221> unsure
<222> (778)

61

<223> n = a, c, g or t

<220>

<221> unsure

<222> (785)..(786)

<223> n = a, c, g or t

<220>

<221> unsure

<222> (792)

<223> n = a, c, g or t

<220>

<221> unsure

<222> (804)

<223> n = a, c, g or t

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aggggtatgt tgtaataaaa tccgctgtct tccctctgca actactggga tatgatgtcg 180
atccaattaa ttccgtgcag ttttgcatac atacaggata tccgacgtt aagggtcagg 240
tttgaatgg acagcaactc tggatctaa tgcaggcct tgaaggaaat gatttattgt 300
tctatactca ctgcataaca gtttatattg gttcagatc ttttctaaac actgtattgc 360
aagttgtcag caaacttcgg tcaacaaaacc caggctttc gtatgtatgt gatccagtga 420
tgggtgatga aggaaagctt tatgttcctc aagagctgt atcagtctat cgtgagaagg 480
ttgttccagt agcttcaatg ttgactccca accagtttgaa agcagaacta ctgacaggct 540
ttaggattca gtctgaagga catggccggg aggctgttag gcttctccat gcagctggc 600
cttcaaaggn cataattaca agtataaata tagacgggat tcttcttcatttgc 660
atccaaaaga aaagggagag ccnccngac aatttaagat tgttattcca aaaataacca 720
gcttatttta cgsgaacggg anancncatg actgnattcn tcttggttng agcataanta 780
cccannacaa ancttgagaa tgcngcggaa ct 812

<210> 6

<211> 196

<212> PRT

<213> Glycine max

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<222> (178)

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<220>

<221> UNSURE

<222> (189)

<223> Xaa = any amino acid

<400> 6

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Val Leu Ser Ile Gln Ser His Thr Val Gln Gly Tyr Val Gly Asn Lys
20 25 30

Ser Ala Val Phe Pro Leu Gln Leu Leu Gly Tyr Asp Val Asp Pro Ile
35 40 45

Asn Ser Val Gln Phe Ser Asn His Thr Gly Tyr Pro Thr Phe Lys Gly
50 55 60

61

Gln Val Leu Asn Gly Gln Gln Leu Trp Asp Leu Ile Glu Gly Leu Glu
65 70 75 80

Gly Asn Asp Leu Leu Phe Tyr Thr His Leu Leu Thr Gly Tyr Ile Gly
85 90 95

Ser Glu Ser Phe Leu Asn Thr Val Leu Gln Val Val Ser Lys Leu Arg
100 105 110

Ser Thr Asn Pro Gly Leu Ser Tyr Val Cys Asp Pro Val Met Gly Asp
115 120 125

Glu Gly Lys Leu Tyr Val Pro Gln Glu Leu Val Ser Val Tyr Arg Glu
130 135 140

Lys Val Val Pro Val Ala Ser Met Leu Thr Pro Asn Gln Phe Glu Ala
145 150 155 160

Glu Leu Leu Thr Gly Phe Arg Ile Gln Ser Glu Gly His Gly Arg Glu
165 170 175

Ala Xaa Arg Leu Leu His Ala Ala Gly Pro Ser Lys Xaa Ile Ile Thr
180 185 190

Ser Ile Asn Ile
195

<210> 7
<211> 773
<212> DNA
<213> Triticum aestivum

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atccagtccc acaccgtcca ggggtatgtt ggcaacaaat cggccgtctt tcccctgcag 120
ctccttgct ttgatgtgga tccaataaac tctgtacagt tttctaatac tacaggatac 180
ccaacattta gagggtcagt tcttaatggc aaacagctct gggaaatttat tgaaggactg 240
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tatgttgtg acccagtctc aggtgatgaa gggaaaactat atgttcctca ggagctaata 420
tctgttatac aacagaaggt tggccctgtt gttcaatgc ttacacctaa ccaatttgaa 480
gttgaactac ttactggatt gaggatcacc tccgaagaag atggtttgac agcttgata 540
accctccaca gtgccggacc acagaagggt gtataacta gtgctctt tgaaggtaag 600
ctgctcccta tcggaagtca caaaaaaaca gaggaacaac agccagaaca atttaagatt 660
gagataacca agataacctgc atatttcacg ggaactggag atttgacaac tgctctcccta 720
ctaggatgga gtaataataa tcctgatatac ctcgaggggg ggcgtacca aat 773

<210> 8
<211> 256
<212> PRT
<213> Triticum aestivum

<400> 8
Met Ala Arg Pro Pro Ile Leu Ser Val Ala Leu Pro Ser Asp Thr Gly
1 5 10 15

Arg Val Leu Ser Ile Gln Ser His Thr Val Gln Gly Tyr Val Gly Asn
20 25 30

32

Lys Ser Ala Val Phe Pro Leu Gln Leu Leu Gly Phe Asp Val Asp Pro
35 40 45

Ile Asn Ser Val Gln Phe Ser Asn His Thr Gly Tyr Pro Thr Phe Arg
50 55 60

Gly Ser Val Leu Asn Gly Lys Gln Leu Trp Glu Leu Ile Glu Gly Leu
65 70 75 80

Glu Glu Asn Gln Leu Leu His Tyr Thr His Leu Leu Thr Gly Tyr Ile
85 90 95

Gly Ser Val Ser Phe Leu Asp Thr Val Leu Gln Val Val Glu Lys Leu
100 105 110

Arg Ser Val Asn Pro Asp Leu Val Tyr Val Cys Asp Pro Val Leu Gly
115 120 125

Asp Glu Gly Lys Leu Tyr Val Pro Gln Glu Leu Ile Ser Val Tyr Gln
130 135 140

Gln Lys Val Val Pro Val Ala Ser Met Leu Thr Pro Asn Gln Phe Glu
145 150 155 160

Val Glu Leu Leu Thr Gly Leu Arg Ile Thr Ser Glu Glu Asp Gly Leu
165 170 175

Thr Ala Cys Asn Thr Leu His Ser Ala Gly Pro Gln Lys Val Val Ile
180 185 190

Thr Ser Ala Leu Ile Glu Gly Lys Leu Leu Leu Ile Gly Ser His Lys
195 200 205

Lys Thr Glu Glu Gln Gln Pro Glu Gln Phe Lys Ile Glu Ile Pro Lys
210 215 220

Ile Pro Ala Tyr Phe Thr Gly Thr Gly Asp Leu Thr Thr Ala Leu Leu
225 230 235 240

Leu Gly Trp Ser Asn Lys Tyr Pro Asp Ile Leu Glu Gly Gly Tyr Gln
245 250 255

<210> 9

<211> 828

<212> DNA

<213> Zea mays

<220>

<221> unsure

<222> (74)

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tcctttaccc tggcacatc aatgtgtgt agaattggaa aagctccatc tggtaaaatt 180
tcatctctca gggagaacta tatttcccct gaacttcttg agagtcaggat gatgtctgat 240
ccatttgatc agttccttaa atggttgtat gaagcgtaa cagccggtcc cggtctgct 300
gagcccaatg caatggcttt gacaactgcc aacaaggaaag gaaaaccttc ttcgaggatg 360
gttcttttaa agggagttga taaacagggta tttgtttgtt atacaatatta tggtagccgg 420

33

a~~g~~ggcgc~~at~~g actt~~gt~~gtga aaacccta~~ac~~ gcagcactcc ttttctactg gaatgagatg 480
aaccgtcagg taagagt~~tg~~ga agg~~gt~~cagtt gagaagg~~tc~~ cagaagct~~g~~a atcagataaa 540
tat~~t~~ccaca gccc~~cc~~ac~~g~~ tggaagt~~ca~~ tagt~~cg~~cca aatt~~gg~~aa~~c~~aaaatattct 600
gtaatt~~tg~~ct~~g~~ gaagagaagt tctt~~ca~~ac~~ag~~ gattacaaga aatt~~gg~~aa~~c~~aaaatattct 660
gatggag~~ct~~ tgatt~~cc~~aaa ac~~ct~~gaat~~at~~ tggg~~gt~~ggct acaaatt~~tg~~ac accgacactt 720
ttt~~g~~agg~~t~~tct g~~ca~~agg~~ac~~ a~~c~~ag~~t~~ct~~g~~a ct~~g~~cat~~g~~acc g~~t~~tacaata ctc~~g~~cag~~ag~~ 780
gaagtagat~~g~~ ggagcac~~ag~~ gt~~gg~~ca~~c~~atc gagag~~gt~~ttg ccc~~ct~~tg~~a~~ 828

<210> 10
<211> 275
<212> PRT
<213> Zea mays

<220>
<221> UNSURE
<222> (25)
<223> Xaa = any amino acid

<400> 10

Met Leu Val Ser Leu Thr Ala Pro Lys Leu Cys Ala Lys Lys Phe Thr
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Gly Pro His His Phe Leu Gly Gly Xaa Phe Val Pro Pro Pro Ile Leu
20 25 30

Asn Gln Leu Arg Asp Phe Ser Ser Ser Phe Thr Leu Gly Thr Ser Met
35 40 45

Cys Val Arg Ile Gly Lys Ala Pro Ser Val Glu Ile Ser Ser Leu Arg
50 55 60

Glu Asn Tyr Ile Ser Pro Glu Leu Leu Glu Ser Gln Val Met Ser Asp
65 70 75 80

Pro Phe Asp Gln Phe Leu Lys Trp Phe Asp Glu Ala Val Thr Ala Gly
85 90 95

Pro Gly Leu Arg Glu Pro Asn Ala Met Ala Leu Thr Thr Ala Asn Lys
100 105 110

Glu Gly Lys Pro Ser Ser Arg Met Val Leu Leu Lys Gly Val Asp Lys
115 120 125

Gln Gly Phe Val Trp Tyr Thr Asn Tyr Gly Ser Arg Lys Ala His Asp
130 135 140

Leu Cys Glu Asn Pro Asn Ala Ala Leu Leu Phe Tyr Trp Asn Glu Met
145 150 155 160

Asn Arg Gln Val Arg Val Glu Gly Ser Val Glu Lys Val Pro Glu Ala
165 170 175

Glu Ser Asp Lys Tyr Phe His Ser Arg Pro Arg Gly Ser Gln Leu Gly
180 185 190

Ala Ile Val Ser Lys Gln Ser Thr Val Ile Ala Gly Arg Glu Val Leu
195 200 205

Gln Gln Asp Tyr Lys Lys Leu Glu Gln Lys Tyr Ser Asp Gly Ser Leu
210 215 220

RSY

Ile Pro Lys Pro Glu Tyr Trp Gly Gly Tyr Lys Leu Thr Pro Thr Leu
225 230 235 240

Phe Glu Phe Trp Gln Gly Gln Ser Arg Leu His Asp Arg Leu Gln
245 250 255

Tyr Ser Gln Arg Glu Val Asp Gly Ser Thr Val Trp His Ile Glu Arg
260 265 270

Leu Ser Pro
275

<210> 11
<211> 555
<212> DNA
<213> Oryza sativa

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<220>
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S

<222> · (549)
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<220>
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<223> n = a, c, g or t

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ccatatcccg gtaccta atgtgtgaga attggaaaag ctccatctgt tgacatttca 180
tctctaagaa gaaattacat cttccctgaa cttctcgagn aacaggtgat gcctgatcca 240
tttgataant tcgttagatg gtttgatgaa ctgttacgct ggctacgtga accaaatgct 300
atggtaaca actccgataa ggaggaaaa cttcgcaaag aatggcctt aanggngttg 360
ataaccacgg attttttggg ancaattntg ganccaaaag gacatgatta cctgaaaacca 420
aatgcngccn gttncantgg aaggaataac ggcagtaaaa taaagtctgt canangtcca 480
aaaaagactg agatttcaaa cnccanagga ataacttng aatntcacac angcanncat 540
ctganggant ncagg 555


<210> 12
<211> 110
<212> PRT
<213> Oryza sativa

<220>
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<222> (74)
<223> Xaa = any amino acid

<220>
<221> UNSURE
<222> (83)
<223> Xaa = any amino acid

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Gly Pro His His Phe Leu Gly Gly Arg Phe Val Pro Pro Pro Ile Val
20 25 30

Ser Lys Tyr Lys Leu His Leu Pro Pro Tyr Pro Gly Thr Ser Met Cys
35 40 45

Val Arg Ile Gly Lys Ala Pro Ser Val Asp Ile Ser Ser Leu Arg Arg
50 55 60

Asn Tyr Ile Ser Pro Glu Leu Leu Glu Xaa Gln Val Met Pro Asp Pro
65 70 75 80

Phe Asp Xaa Phe Val Arg Trp Phe Asp Glu Leu Leu Arg Trp Leu Arg
85 90 95

Glu Pro Asn Ala Met Val Asn Asn Ser Asp Lys Glu Gly Lys
100 105 110

<210> 13
<211> 864
<212> DNA

89

<213> Glycine max

<400> 13

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acagccccaa gattagggtgc aaagaagttt ggtggtcctc accacttctt aggaggtaga 120
tttgtcccac ctgttattgc agaaaaat aagttatac ttccaccata tcctggaact 180
tccatgtgtg ttcaatttg aaggcctcca cgtattgata tctcagctct aagagagaac 240
tatatctctc cagaatttct tgaagagcag gtggaggctg accctttaa tcagtttcat 300
aatggttta atgatgcatt ggctgctgtt ttgaaggaac caaatgctat gtccttgca 360
actgttaggaa aggacggaaa accctcatca agaatggat tgctaaaagg cttggataag 420
gaaggatttg tgtggtacac aaactatgaa agtcgaaagg cacgtgaatt atctgaaaat 480
ccacgtgcac cacttctttt ttactggat ggtttaaacc ggcaggtacg ggtggaaagg 540
cctgttcaga aagtctctga tgaggaatca gaacagtatt tccatagccg ccctagaggt 600
agttagattt gagaatagt cagcaagcag agtactgtag tgccggtag gcatgttctt 660
tatcaggagt acaaagagct ggaagaaaaa tactctgtat gaagtttaat ccctaaacct 720
aagaactggg gtggatataq gctaacacca caactttcg agtttggca agggcagaaa 780
tctcgcttgc atgacaggtt gcaatatact ccccatgaga tcaatggaca acggctgtgg 840
aaggttgacc ggtggctcc ttga 864

<210> 14

<211> 287

<212> PRT

<213> Glycine max

<400> 14

Met Leu Lys Arg Glu Asp Val Asp Gly Thr Gly Ile Lys Pro Asp Met
1 5 10 15

Leu Val Ser Leu Thr Ala Pro Arg Leu Gly Ala Lys Lys Phe Gly Gly
20 25 30

Pro His His Phe Leu Gly Gly Arg Phe Val Pro Pro Ala Ile Ala Glu
35 40 45

Lys Tyr Lys Leu Ile Leu Pro Pro Tyr Pro Gly Thr Ser Met Cys Val
50 55 60

Arg Ile Gly Arg Pro Pro Arg Ile Asp Ile Ser Ala Leu Arg Glu Asn
65 70 75 80

Tyr Ile Ser Pro Glu Phe Leu Glu Gln Val Glu Ala Asp Pro Phe
85 90 95

Asn Gln Phe His Lys Trp Phe Asn Asp Ala Leu Ala Ala Gly Leu Lys
100 105 110

Glu Pro Asn Ala Met Ser Leu Ser Thr Val Gly Lys Asp Gly Lys Pro
115 120 125

Ser Ser Arg Met Val Leu Leu Lys Gly Leu Asp Lys Glu Gly Phe Val
130 135 140

Trp Tyr Thr Asn Tyr Glu Ser Arg Lys Ala Arg Glu Leu Ser Glu Asn
145 150 155 160

Pro Arg Ala Ser Leu Leu Phe Tyr Trp Asp Gly Leu Asn Arg Gln Val
165 170 175

Arg Val Glu Gly Pro Val Gln Lys Val Ser Asp Glu Glu Ser Glu Gln
180 185 190

38

Tyr Phe His Ser Arg Pro Arg Gly Ser Gln Ile Gly Ala Ile Val Ser
195 200 205

Lys Gln Ser Thr Val Val Pro Gly Arg His Val Leu Tyr Gln Glu Tyr
210 215 220

Lys Glu Leu Glu Glu Lys Tyr Ser Asp Gly Ser Leu Ile Pro Lys Pro
225 230 235 240

Lys Asn Trp Gly Gly Tyr Arg Leu Thr Pro Gln Leu Phe Glu Phe Trp
245 250 255

Gln Gly Gln Lys Ser Arg Leu His Asp Arg Leu Gln Tyr Thr Pro His
260 265 270

Glu Ile Asn Gly Gln Arg Leu Trp Lys Val Asp Arg Leu Ala Pro
275 280 285

<210> 15

<211> 456

<212> DNA

<213> Triticum aestivum

<400> 15

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35 40 45

Val Ser Glu Glu Glu Ser Glu Lys Tyr Phe His Ser Arg Pro Arg Gly
50 55 60

Ser Gln Leu Gly Ala Ile Val Ser Lys Gln Ser Thr Val Ile Ser Arg
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Glu Val Leu Gln Gln Ala Tyr Lys Glu Leu Glu Gln Lys Tyr Ser Asp
85 90 95

Gly Ser Phe Ile Pro Lys Pro Asp Tyr Trp Gly Gly Tyr Lys Leu Thr
100 105 110

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Pro Asn Leu Phe Glu Phe Trp Gln Gly Gln Gln Ser Arg Leu His Asp
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Arg Leu Gln Tyr Ser Gln Arg Glu Leu Gly Gly Ser Thr Glu Trp His
130 135 140

Ile Gln Arg Leu Ser Pro
145 150

B

W